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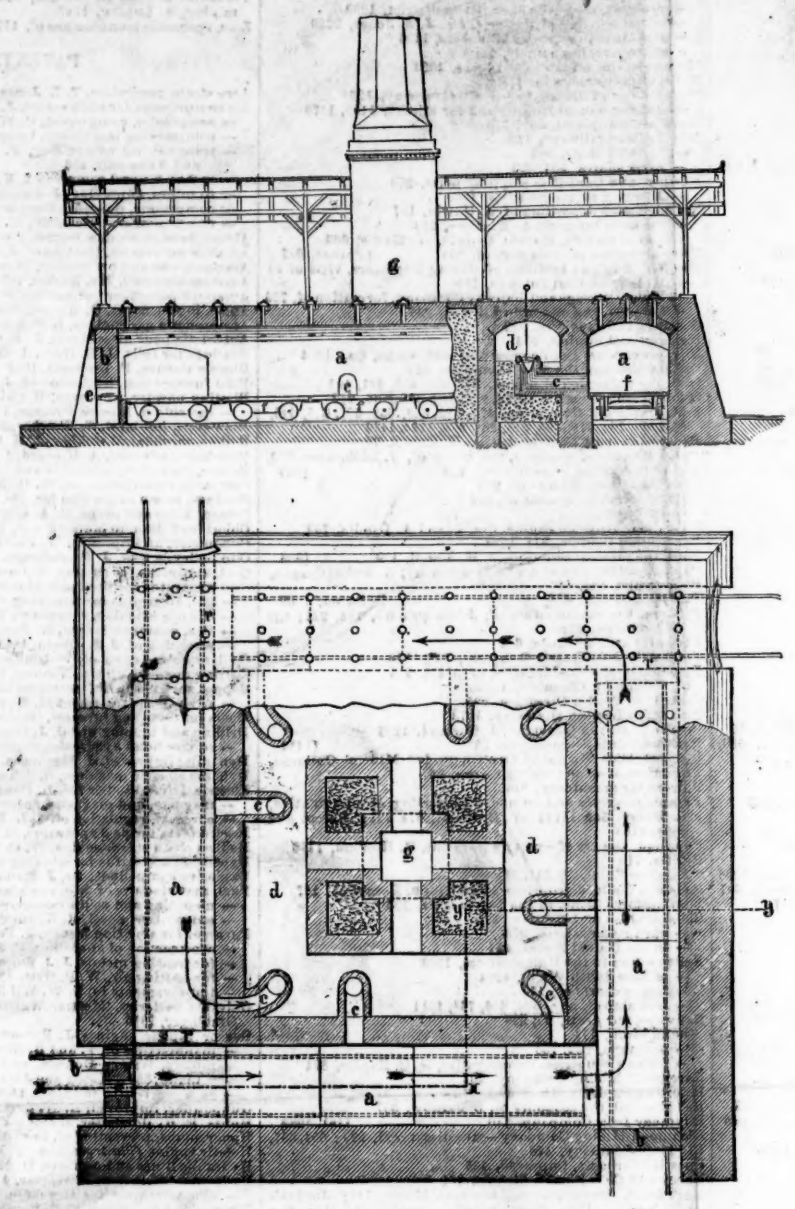

DUEBERG'S BRICK KILNS.

Two systems of continuous kilns for burning bricks, tiles, &c., have hitherto come into practical use:—1. The French system of Colas, also known as that of Borie, with their English imitators, Foster and others.—2. The German system of Hoffman, the well-known annular kiln or ring-oven. The principle of the kilns of Colas, Borie, and their imitators, including Foster's and others, consists in placing the air-dried bricks on small railway trucks, forming a long train, which is slowly moved through an arched chamber, provided in its centre with fixed fire-places for burning the bricks; the fire in these kilns is stationary, while the bricks are being moved forward. The principle of the Hoffmann kiln is just the reverse; here the bricks are stacked in an annular burning chamber, and remain stationary, while the fire travels through them, leaving burnt bricks in the rear, and advancing into and amongst the green bricks. The annular shape of the burning chamber allows a continuous operation of the kiln, the fire progressing in the circuit without interruption, while the burnt bricks behind the fire are continuously replaced by green bricks. The first-named system is also worked continuously, the train being supplied in the rear with trucks containing green bricks at the same rate as trucks with burnt bricks are withdrawn in the front.

The first-named system, patented a number of years ago in France by M. Colas, was first carried into practice in the year 1854, by MM. Paul Borie et Cie., at Commercy, where they had erected a kiln, in which perforated bricks and tiles were burned. Similar kilns have since then been contructed and used, with more or less success, by many others; for instance, in Germany by Herr Otto Bock, of Brunswick; in France by M. Carot fils, of Abondant, Eure et Loire, &c. Lately Messrs. John Foster and Charles James Foster, of Normanton, Yorkshire, have obtained a patent in this country for a similar kiln. All kilns of this kind, however, compared with the kilns of the said second system of Hoffmann, have met with little success, much objection against them having arisen from frequent interruptions in their operation, caused by the fact that a long train of loaded trucks cannot be moved continuously through a fire in an arched chamber, with sufficient certainty. A brick, accidentally falling from a truck, or a piece of coal or cinder getting in between a truck and the kiln wall, will stop the whole train. The principal advantage of these kilns, the saving of labour on account of less handling of the bricks, is more than paralysed by the frequent interruptions in the operations of the kiln just referred to. Besides this, it has been found very difficult to keep the joints air-tight between the trucks and kiln walls, as well as those between the trucks themselves, while these are in motion, and for this reason it is almost impossible properly to protect against the fire their axles and axle-boxes.

The kiln shown in the accompanying illustrations, the invention of Herr H. Dueberg, of Berlin, Germany, combines all the advantages of the said Hoffmann system of annular kilns,—saving in fuel, uniformity in burning and certainly in working, with the saving in labour obtained by the kilns of Colas, Borie, Foster, &c., but avoiding all the defects of this latter system. This object is obtained by constructing an annular kiln with a movable floor, which consists of a series of sections or platforms; these platforms are supported by wheels and axles, which run on a railway track extending all along the floor of the arched burning chamber. The platforms therefore are railway trucks, similar to those used in the kilns of Colas, Borie, and Foster. The principal difference and at the same time the principal advantage offered by Dueberg's kiln, compared with those of Colas, Borie, Foster, &c., is that the platform-trucks are not moved during the burning of the bricks; on the contrary, they are at rest during the entire process of burning, while the fire is advancing through the bricks in the same manner as it does in the Hoffmann kiln; the fuel is dropped into and amongst the goods to be burnt, from above through small holes in the arch of the burning chamber.

The trucks, after being loaded with green bricks, are run into the kiln one by one, each close up against the preceding one; the back of each truck is coated with clay before the next truck is pushed against it, and thus the joint is made air-tight. The two sides of the platforms parallel to the wall of the burning chamber are made air-tight by filling the joints between the platforms and the kiln walls with sand, as soon as a truck loaded with green bricks has been run into the kiln, close up against the platform of the preceding truck. There is no danger of the joints between the platforms and the kiln walls, as well as of those between the platforms themselves, not remaining air-tight during the process of burning, because everything is then at rest. On the other hand, the working of the kiln cannot be interfered with, as has been the case with the kilns of Colas, Borie, Foster, and others, by such accidents as named before, from falling bricks or cinders. Such accidents have been fatal objections to the more general use of the above kilns. In Dueberg's kiln, the trucks are not moved until the bricks are completely burnt and sufficiently cooled down to be removed, when the trucks are drawn out one by one; they are, therefore, never moved all at the same time, and moreover, the trucks are never moved while being hot, but only when cold. In the kilns of Colas, Borie, Foster &c., all the trucks must be moved at once; and while a portion of these are passing through the fire, their axles are heated and no lubrication is possible. In Dueberg's kiln, the axles of each truck may be lubricated, before the same is drawn out of the kiln, as they are then quite cold. For all these reasons, the trucks of Dueberg's kiln may be made much larger than those of the kilns of Colas, Borie, Foster, &c., and consequently the area of the burning chamber of Dueberg's kiln may also be made much larger than that of said kilns. It is evident that one truck containing 5000 bricks, can be moved much more easily than a train of about 30 trucks, each containing 1000 bricks, the axles of about one-fourth of which trucks are almost red-hot. The successors of Colas and Borie, therefore, had to use steam engines and hydraulic pumps for moving their long line of trucks through the fire and have thereby frequently injured the trucks. Dueberg's kiln requires no engine for moving the trucks, but only a crab which is placed in front of the doorway of the burning chamber from where the trucks are to be drawn by hand, one truck after the other.

It is also evident that the labour in setting, as well as in drawing the bricks is much easier in Dueberg's kiln than in all others; the labourers are not compelled to work in the hot, dusty atmosphere of the burning chamber, which is very objectionable in all other arched kilns. In setting the bricks for burning, as well as in removing them from the kiln, they are only handled once, while with other kilns they are in each case handled twice, first put on a wheelbarrow, and then taken off again and stacked. Dueberg's kiln may be built for continuous as well as for periodical operation.

The accompanying illustration represents a kiln for continuous operation, with four burning chambers *a a*; *b b* are walls temporarily built up for closing the door-ways of said burning chambers, *c c* are the smoke flues, *d* is the smoke chamber, *g* the chimney; *e e* are grates for starting the fire in one of the temporary walls *b b*; *f f* are the platform-trucks, on which the bricks are piled. Dueberg's kiln has been patented in this country by Mr. H. Wedekind, of 158, Fenchurch-street, London, and is represented in the North of England by Messrs. Yeadon and Co., engineers, Albion-place, Leeds.

STEAM HEATING FOR TOWNS.

In reference to the system of supplying steam for warming houses and other domestic purposes, Mr. George Maw, Benthall Hall, Broseley, sends us the following notes of a visit paid by him in May last to the works of the Holly Steam Combination Company, at Lockport. The conclusion at which Mr. Maw arrives, after inspecting the system, is that "this novel application of steam is destined in a few years to completely revolutionise the heating of buildings in towns, and that heat can be laid on and supplied, like gas, from a common centre, within almost any reasonable distance, and at a cost much below that of any system of domestic heating in use." His account of the works and of the method of supply is as follows:—"The experimental works in Lockport were commenced last year, and during the late winter about 200 houses in the city were heated from the central supply, through about three miles of piping, radiating from the boiler-house, containing two boilers 16 ft. by 5 ft., and one boiler 8 ft. by 8 ft. These boilers were during the winter fired to a pressure of 35 lb. to the inch, with a consumption of 4 tons of anthracite, costing $4\frac{1}{2}$ a ton; during the summer but one boiler is fired, consuming $1\frac{1}{4}$ ton of anthracite in 24 hours, and a pressure of 25 lb. per inch maintained. The boiler pressure of 35 lb. in winter and 25 lb. in summer is maintained through the entire length of the three miles of piping up to the points of consumption, where there is a cut-off under the control of the consumers. The first 600 ft. of mains from the boilers are but 4 in. in diameter. There are 1406 ft. of 3 in. pipes, and 2000 ft. of 2 in. pipes. The supply pipes from these mains to the houses are $1\frac{1}{2}$ in. in diameter, and within each house $\frac{3}{4}$ in. pipes are used. In addition to the cut-off tap from the main under the control of the consumer there is a pressure valve regulated to a 5 lb. pressure under the control of the company, and beyond this is an ingeniously constructed meter, which not only indicates the total consumption of cubic feet of steam, but also the quantity of steam used in each apartment. At each 100 ft. of main an expansion valve, like an ordinary piston and socket, is inserted, allowing an expansion in each section of 100 ft. of $1\frac{3}{4}$ in. for the heat at 35 lb. pressure. No condensation whatever occurs in the mains. They are covered with a thin layer of asbestos paper, next the iron, then a wrapping of 'Russian felt,' and finally wrapped round with 'Manilla paper,' like smooth brown paper over all, and the whole encased in timber bored out $\frac{3}{4}$ in. larger than the felt-covered pipes, and laid along the streets like gas-pipes. The distribution of heat in the apartments is by means of radiators, consisting of inch pipes 30 in. long, placed vertically either in a circle or as a double row, and connected together top and bottom, with an outlet pipe for the condensed water which escapes at a temperature at a little below boiling, and is sufficient for all the domestic purposes of the house, or is used as accessory heating power for horticultural and other purposes. The steam has also been supplied at a distance of over half-a-mile from the boilers for motive power, and two steam-engines of 10-horse and 14-horse power are worked from the boilers at a distance of half-a-mile, but with a slightly-increased consumption of fuel. The laid-on steam is also being used for cooking purposes—for boiling, and even baking; and I witnessed in a house three-quarters of a mile from the boilers a bucket of cold water raised to boiling heat in three minutes, by the passage of the steam through a perforated nozzle plunged into the bucket. As in the case of gas supply, the Steam Supply Company lay their pipes up to the houses, the consumer paying for all internal pipes, fittings, and radiators. In a moderately-sized eight-roomed house the expenses of these amounted to $150, or a trifle over 30*l.*; and in larger houses, with more expensive fittings, to $500, or 106*l.* or 107*l.* The operations of the Heating Company have been up to the present time of an experimental character, and from the 200 houses already supplied with the heating connection, the actual cost of the coal that would have been used for heating has been provisionally received in payment, and the amount has left a wide margin over the working expenses, though the company's operations at present cover but a small portion of the area for which they have provided plant. The working expenses consist of but little more than the coal and the wages of two firemen, and the central plant appears very small, both in coal and bulk, for the results obtained. The capital of the company consists of $50,000, in 500 shares of $100 each, which has covered the cost of the central plant, and the three miles of steam pipes laid through the city."

CONCRETE WALLS.—For the construction of cheap and durable buildings about mines there is probably no material superior to concrete, since there is always an abundance of suitable attle, and all that would have to be secured is a comparatively limited quantity of Portland cement or good lime. In connection with the use of this material some improvements have been patented by Mr. THOMAS POTTER, of Alresford, Hants. The methods hitherto practised in constructing walls of this description have been to connect the framework of slabs together by means of tie bars, rods, wall guages, or cramps made of metal or cement, the ends of which are inserted into slots or metal eyes, made or cast in the facing blocks, but by Mr. Potter's method he forms the facing blocks with projecting flanges or lugs at each end, of a peculiar shape, so that the semi-liquid concrete used as a filling-in material between the slabs, keys or dovetails the whole into one solid mass, without the intervention of any permanent kind of transverse tie or cramp. The slabs of the inner side of any wall of a building being connected to the bulk of the material independent of the assistance of the outer slab, he is thus enabled to employ bricks, terracotta, stone, or other material, as an external facing in place of concrete, if so required, for the sake of appearance or from other motives, and to introduce projecting cornices, mouldings, or ornament of any description into the external or internal sides of walls. He thus avoids the inconvenience of being compelled to arrange the slots or holes in the slabs forming the inner shell of walls, to correspond with the slots or holes in the corresponding slab of the external shell of wall. He forms the slabs or tiles by casting them in moulds made of wood or metal, and with the faces of the said slabs downwards, enabling him to obtain smooth and finished surfaces to the outer side of the slab, and leaving the reverse or inner side of slab rough and irregular, whereby additional hold is secured to the concrete core. Where greater economy is necessary in the employment of concreted materials, or when from other causes walls of a less substantial character are equally suitable, he deposits the concrete employed as a filling-in material (in a soft state) in layers of various thicknesses, according to requirements, filling up the interstices or cavities with chalk, sand, ashes, gravel, earth, or debris of any kind that may be most readily procured. He thus forms concrete walls with a minimum of materials, but possessing great strength and durability, and which are also serviceable as division walls or partitions in positions where heavy walls are objectionable.